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Capital budgeting practices: A comparative study between a port company in Brazil and in Spain

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This study aims to analyze the capital budgeting practices used in port company in Brazil and another in Spain from a comparative perspective. To meet this objective an empirical research was conducted to study these two ports and a questionnaire was administered to collect data. The results showed that the Brazilian port uses only the internal rate of return for capital budgeting analysis combined with the random rate to determine the minimum acceptable return, and scenario analysis to assess investment risks. The Spanish port, compared to the Brazilian one, uses all methods, including payback, internal rate of return, net present value, real options valuation, and weighted average capital cost to determine the minimum rate of return, and scenario and sensitivity analyses, simulation, and decision tree to assess investment risks.

Key words: Capital budgeting, techniques, port, Brazil, Spain.

INTRODUCTION

A budgeting is considered an essential management tool to help corporations evaluate their performance and motivate people (Waal et al., 2011). Empirical studies show that budgets continue to be an indispensable tool for planning and control and is widely used by organizations (Abdel-Kader and Luther, 2006; Uyar, 2009; Sivabalan et al., 2009; Libby and Lindsay, 2010; Ostergren and Stensaker, 2011; Uyar and Bilgin, 2011).

One of the important steps in budgets preparation is the development and analysis of capital budgeting. According to Koch et al. (2009) capital budgeting decisions are among the most important decisions to be made by organizations, essential to their survival and

success in the long term (Bennouna et al., 2010), besides being one of the most difficult decisions to be made by managers (Carmona et al., 2011). The reason is that, firstly, capital expenditures typically require large amount of resources. Secondly, the companies must determine the best way to obtain and return such resources. Thirdly, most of the capital budgeting decisions demand long-term commitments, and finally, the time of decision is crucial (Chan, 2004; Olawale et al., 2010).

Capital budgeting is the process of making planning decisions for long-term investments (Horngren et al., 2000). There is a number of technique commonly used to evaluate capital budgeting projects, i.e., payback,

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accounting rate of return, net present value and internal rate of return, and profitability index (Brijlal and Quesada, 2009). According to Kierulff (2008), in the past 60 years Net Present Value (NPV) and Internal Rate of Return (IRR) emerged from obscurity to become one of the overwhelming choices for the quantitative measurement of investments' attractiveness in modern companies.

Due to the wide use of NPV and IRR, discounted cash flow – DCF has become the prevailing method of evaluation in Canada (Jog and Srivastava, 1995; Payne et al., 1999), UK (Arnold and Hatzopoulos, 2000) and USA (Farragher et al., 1999; Graham and Harvey, 2001; Ryan and Ryan, 2002). According to Kester et al. (1999), discounted cash flow (DCF) techniques, such as the net present value (NPV) and the internal rate of return (IRR) have become the prevailing methods in assessing and ranking capital investments.

Other techniques, such as real options valuation have been indicated as having potential to enhance the understanding of impacts by handling uncertainties directly (Tyler and Chivaka, 2011). Studies have shown that companies are reluctant to use real options valuation (Peel and Bridge, 1998; Sandahl and Sjogren, 2002; Block, 2003; Hermes et al., 2007 and Truong et al., 2008), although a recent study conducted by Hall and Millard (2010) showed that this methodology is often used in South African companies.

What happens is that decision makers often have to choose among several options, based on various criteria, without a prevailing option for all criteria. This is because the decision maker must not only evaluate each option and each criterion but also weigh the relative importance of each criterion before making the final decision (Carmona et al., 2011). According to Kalhoefer (2010), discussions about the best method to be used in capital budgeting have been long and intensive. Differences between NPV and IRR seem to cause everlasting problems.

A number of surveys have been carried out in developed countries worldwide offering an interesting view on capital budgeting practices (Hermes et al., 2007; Lazaridis, 2004; Sandahl and Sjogren, 2003; Kester et al., 1999; Drury and Tayles, 1996; Jog and Srivastava, 1995; Segelod, 1998; Peel and Bridge, 1998; Graham and Harvey, 2001; Akalu, 2003; Brounen et al., 2004; Verbeeten, 2006; Hermes et al., 2007; Lam et al., 2007; Truong et al., 2008; Holmén and Pramborg, 2009; Brijlal and Quesada, 2009; Mkhize and Moja, 2009; Samad and Shahrudin, 2009; Chazi et al., 2010; Bennouna et al., 2010; Olawale et al., 2010), but studies using a comparative perspective, examining companies in the same industry in different countries are rare.

Brazil and Spain were chosen due to several factors. On the one hand, Brazil is an emerging country, even though with poor infrastructure and deficient port systems in many aspects. On the other hand, Spain is a typical example of developed country, member of the European

community, with efficient port services, ranking fifth in Europe. Another important aspect is the lack of works in port companies relating to capital budgeting.

Studies on ports are justified on the grounds that the ineffective practice of the many activities performed in a port affects directly the goods distribution process, the environment, and society, with an impact on the international trade and zones of influence. Furthermore, efficient ports and sea transportation services as well as strong intermodal systems are crucial for the growth and the economic and social development of a country (González, 2005; Crucey, 2006; Giner et al., 2010). In order for ports to improve the efficiency of their operations it is imperative to invest their resources appropriately in projects that generate sustained growth in the medium and long term. Given the above, it is important to examine which capital budgeting practices are used in the Brazilian port companies, compared to the Spanish ones.

To meet the objective of this study, which is to examine the capital budgeting practices in Brazilian and Spanish port companies from a comparative perspective, this study presents, in addition to this introduction, an overview of capital budgeting techniques. The third section consists of an exposition of the methodological procedures used in the research. The fourth section presents the results, and the fifth section contains the discussions and conclusions this work.

CAPITAL BUDGETING

Capital budgeting is the process of making planning decisions and analysis of opportunities for long-term investments in assets to produce benefits for more than one year (Hornngren et al., 2000; Peterson and Fabozzi, 2002).

The decisions made during the process of development and evaluation of capital budgeting determine the future growth and productivity of the company, and it helps to achieve greatest profitability (Olawale et al., 2010).

Investments appraisal techniques

A core feature of any investment assessment is the use of discounted cash flow – DCF, which takes into account the time value of money and theoretically is considered the most appropriate method, including at least four different discount models: net present value (NPV), internal rate of return (IRR), modified internal rate of return (MIRR), and the profitability index (PI) (Brigham and Ehrhardt, 2002).

Net present value – NPV is the present value of the cash flows discounted at the cost of capital less the initial investment effort (Olawale et al., 2010). The calculation of NPV requires the comparison between the present

value of all cash inflows related to the project with the present value of all cash outflows. IRR differs from the net present value method because it determines the potential return of the investment. The internal rate of return is the rate that will make the present value of the proposed capital outlay equal to the present value of cash inflows (Gitman, 1997; Jackson and Sawyers, 2001).

NPV is a popular technique for investment decisions because it is a financial measure that determines the time value of money invested in a business (Peel e Bridge, 1998). IRR is a percentage rate that equates the present value of future cash flows with the present value of its investment expenditures (Bennouna et al., 2010).

The profitability index is the expression of the ratio between the present value of the future cash flows and their initial cost (Ross, 2000). The profitability index is determined by dividing the present value of each proposal by its initial investment (Olawale et al., 2010).

Various methods for investments evaluation do not consider discounted cash flows. Among the most common we can cite payback (PP) and the accounting rate of return (ARR) (Ross et al., 1995, Ross, 2000). In the payback period, the time required for the organization to recover the capital invested is estimated. And the accounting rate of return is the accounting measure of profits divided by the accounting measure of the investment (Horngren et al., 2000).

Real options are options built into real assets (Brealey and Myers, 2003). This technique can be used as a complement to NPV, which then assumes a new value, i.e., the intrinsic value of the investment project plus the value of the exercise of the various options of each project (Block, 2007).

Discount rates

The cost of capital is a key parameter for the calculation of DCF. The companies should preferably use the weighted average cost of various funds and sources, including the cost of debt, preferred stocks, and common equity (Brigham and Ehrhardt, 2002). The weighted average cost of capital (WACC) is the required rate of return on any proposal of investment that has the same level of risk as the assets of a company.

In general, it is recommended that the companies use different rates for the projects of investment or for the units or divisions. When examining the market return, the company can develop different rates for diverse new investments, including projects outside their core business.

Methods of risk analysis

Simple techniques include the adjustment of the discount rates and payback, and the sophisticated methods

include probabilistic risk analysis, such as sensitivity analysis, scenario analysis, decision tree analysis, Monte Carlo Simulation, etc.

The sensitivity analysis is a behavioral approach that uses a number of possible values for a given variable in order to assess its impact on the return of the organization. The scenario analysis is used to evaluate its impact on the return of the organization, resulting from simultaneous changes in a number of variables (Gitman, 1997).

The decision tree is a tool used to identify uncertain cash flows (Ross et al., 1995). This technique consists of a diagram of sequential decisions and possible outcomes (Brealey and Myers, 2003).

The Monte Carlo simulation is a statistical method used in stochastic simulations with various applications and areas (Hromkovic, 2001). According to Moore and Weatherford (2006), the Monte Carlo simulation is one of the various methods designed to evaluate uncertainty propagation, and its advantage is to determine how an already known randomized variation, or error, affects the performance or feasibility of a project that is being modeled.

In addition to the correct use of the financial techniques, literature provides many recommendations for its management and other supports for decisions on capital budgeting. Preferably there should be a manual for capital budgeting (Pike, 1988), full-time people working on capital budgeting (Klammer and Walker, 1984; Pike, 1989), the use of standard model to determine NPV or IRR (e.g., a model in Microsoft Excel), support of information systems (Ho and Pike, 1996) and post-investment audits (Klammer and Walker, 1984; Pike, 1996).

Previous studies

Several studies on capital budgeting practices were performed in many countries over the last decades, and by examining these studies we can see that the subjects can be classified into three categories of analysis: (i) Methods for Evaluation of Investment Budgets; (ii) Techniques for the Analysis of the Rate of Return; (iii) Techniques for Evaluation of Investment's Risks. Table 1 shows a summary of the most usual methods and techniques of capital budgeting used by the companies and presented in studies analyzed in this research.

According to Table 1, among the Methods for Evaluation of Investment Budgets, the studies on NPV – Net Present Value and IRR – Internal Rate of Return are the most common. Regarding the Techniques for the Analysis of the Rate of Return, the most usual are the Weighted Average Capital Cost – WACC. Finally, regarding the Techniques for the Evaluation of Investment's Risks, the primary methods are the Scenario Analysis and Sensitivity Analysis.

Among the works comprising budgeting in ports, we can cite the study performed by Lin and Yahalom (2009) in

Table 1. Main capital budgeting practices in percentage (%).

		Peel and Bridge (1998)	Arnold and Hatzopoulos (2000)	Graham and Harvey (2001)	Sandahl and Sjogren (2002)	Ryan and Ryan (2002)*	Block (2003)	Lazaridis (2004)	Brounen et al. (2004)			Hermes et al. (2007)		Lam et al. (2007)	Truong et al. (2008)	Holmén and Pramborg (2009)	Brilljal and Quesada (2009)	Bennouva et al. (2010)	Chazi et al. (2010)	Hall and Willard (2010)	
Methods for Evaluation of Investments Budgets	NPV– Net Present Value	35.6	43	74.9	52.3	96	11.2	13.4	47.0	70	47.6	35.1	89	49	71.7	94	69	36	94.2	83.3	28.6
	IRR – Internal Rate of Return	38.7	48	75.7	22.7	92.1	16.4	8.9	53.1	56	42.2	44.1	74	89	65.2	80	62	28	87.7	83.3	23.7
	PI – Profitability Index	N/A	N/A	N/A	N/A	43.9	N/A	2.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	72	N/A	N/A	N/A	43.8	4.8
	PP – Payback Period	80.9	30	56.7	78.1	74.5	42.7	36.7	69.2	64.7	50	50.9	79	84	84.8	91	79	39	N/A	73	4.8
	ARR – Accounting Rate of Return	48.2	26	N/A	21.1	33.3	22.4	17.7	N/A	N/A	N/A	N/A	2	9	82.6	57	65	22	N/A	48.5	33.3
	Real Options	N/A	N/A	N/A	0	11.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	32	11	N/A	8	61.3	N/A
	Others	2.02	N/A	N/A	6.3	N/A	7.3	N/A	N/A	N/A	N/A	N/A	2	0	N/A	13	N/A	10	N/A	N/A	N/A
Techniques for Determination of the Rate of Return	Weighted Average Capital Cost – WACC	N/A	54	73.5	N/A	83.2	85.2	6.0	N/A	N/A	N/A	N/A	66.7	53.3	N/A	84	N/A	12	76.1	57.1	N/A
	Debt Cost	N/A	11	15.7	N/A	7.4	N/A	31.0	N/A	N/A	N/A	N/A	14.3	28.9	N/A	34	N/A	24	9.9	29.6	N/A
	Cost of Own Capital	N/A	8	39.4	N/A	1	6.4	20.2	31.3	30.77	18	27.27	9.5	15.7	N/A	72	N/A	15	1.4	50	N/A
	A Random Rate	N/A	6	N/A	N/A	N/A	N/A	26.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A
	Others	N/A	25	N/A	N/A	8.4	8.4	13.1	N/A	N/A	N/A	N/A	9.5	2.2	N/A	N/A	N/A	N/A	12.7	N/A	N/A
Techniques for Analysis of Investment's Risks	Scenarios Analysis	N/A	85	N/A	N/A	66.8	N/A	30.0	N/A	N/A	N/A	N/A	N/A	71.7	N/A	N/A	N/A	85.3	N/A	13.9	
	Sensitivity Analysis	N/A	85	51.5	N/A	85.1	N/A	28.33	42.9	36.73	28.1	10.42	N/A	69.6	N/A	N/A	N/A	92.8	72.7	29.2	
	Monte Carlo Simulation	N/A	N/A	N/A	N/A	37.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.2
	Decision Tree	N/A	N/A	N/A	N/A	31.1	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.8
	Others	N/A	3	N/A	N/A	N/A	N/A	31.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.1
Country	UK	UK	USA	SWE	USA	USA	CYPRUS	UK	HOL.	GER	FRA	HOL	CHINA	Hong Kong	AUS	SWE	AFR.	CAN	Middle East	AFR.	

N/A – Not applicable; *Always, often or sometimes.

the Keelung Harbor about the integration between activities-based budgets and the balanced scorecard.

This lack of studies, particularly in ports in developing countries, shows the importance of carrying out studies on capital budgeting in sea

port companies.

METHODOLOGY

In this section we present the methodological procedures used to build the theoretical framework, procedures for preparation of the questionnaire, and the selection process

of the port companies.

Process for construction of the Theoretical Framework – Proknow-C

The Proknow-C process, used for selecting and analyzing

Table 2. Main features of capital budgeting.

Main features of capital budgeting	
Methods for Investment Analysis	Payback Period – PP Net Present Value – NPV Internal Rate of Return – IRR Profitability Index – PI Accounting Rate of Return – ARR Real Options
Technique(s) used for determining the minimum acceptable rate of return for an investment	Weighted Average Capital Cost – WACC Debt Cost Cost of Own Capital Random Rate Other
Technique(s) used to perform investment's risk analysis	Scenario Analysis Sensitivity Analysis Monte Carlo Simulation Decision Tree Other
Degree of uncertainty or predictability of the environment	Suppliers' Behavior Competitors' Behavior Clients' Tastes and Preferences Financial Market Behavior Government's Behavior Unions' behavior Technological changes
Information obtained by the information systems on investments assessment	Estimated outflows Estimated inflows Capital cost and minimum rate of return Service life Macroeconomic data After-auditing review

Source: Developed by the authors based on the review.

references, is divided into three phases: choice of databases, selection of articles, and systemic analysis (Ensslin et al., 2010). The first phase provides the basis for the choice of databases; the second obtains a portfolio of articles from a structured process, and, the third provides the systemic analysis of the articles portfolio. Based on this structure, we selected 325 articles addressing the budget subject and published in the period of 1990 to 2011. To achieve such amount of papers, the phases and steps were performed sequentially. To refine the search, we used the word "port".

Firstly, we performed a search in the databases of *SCOPUS* and *International Statistical Institute* – ISI using the keywords "*capital budgeting*" and "*practices*".

From this initial sampling, we read all abstracts in order to select the studies relating to the capital budgeting practices. The selected articles comprise the basis of the theoretical framework.

Procedure for development of the questionnaire

The questionnaire was developed based on the main features

indicated in the literature review (Segelod, 1998; Peel and Bridge, 1998; Graham and Harvey, 2001; Akalu, 2003; Brounen et al., 2004; Verbeeten, 2006; Hermes et al., 2007; Lam et al., 2007; Truong et al., 2008; Holmén and Pramborg, 2009; Brijlal and Quesada, 2009; Mkhize and Moja, 2009; Samad and Shaharuddin, 2009; Chazi et al., 2010; Bennouna et al., 2010; Olawale et al., 2010). Such main features mentioned in the literature are shown in Table 2.

Based on the characteristics described in Table 2, we developed the questionnaire described below.

The questionnaire has 11 questions which verified the use of the Capital Budget for the decision making processes at the port.

Initially, it identifies the utilization frequency of the capital budget assessment techniques, using the Likert scale of 05 levels (between never and always). The next question is on the techniques used by the port to define the minimum expected rate of return for a new investment, using a list of possible techniques in which the respondent has multiple answer options. The third question identifies if the port uses the same rate for all of its investments with dichotomous answer option (yes or no). The fourth

question aims to identify the technique used for holding risk analysis using a list of possible techniques, by Likert scale of 05 levels (between never and always). The fifth question aims at investigating the relevance of the used measure(s) by the port manager in the investment process in which the respondent has multiple answer options. The sixth question identifies the investment percentages for three categories: port maintenance, existing application, and expansion. The seventh answer is dichotomous (yes or no), and aims at identifying the direct participation of the members in charge of the analysis and decisions about investment. The eighth question is also dichotomous (yes or no) and aims at identifying if the port has basic policy manuals for investments. The ninth, equally also dichotomous (yes or no), identifies the presence or absence of investment auditing held by the port. The tenth question aims at identifying the uncertainty and predictability degrees of the port stakeholders' behaviours (suppliers, competitors, client, financial market, government, unions and technological changes), for each stakeholder was elaborated a question with answers, using a Likert scale of 05 levels (between unpredictable and always predictable). Finally, it was investigated the information flux generated by the port about the following subjects: Inflows, Outflows, Cost of Capital and Rate of Return, Continuity, Macroeconomics data, Auditing Review.

The questions were elaborated from the literature review. The data were collected by electronics at Spanish and Brazilian port. The same questionnaire was applied to Castellano for the Spanish port and Portuguese for the port in Brazil. The data analysis was done through reading and collected data descriptions on the questionnaire.

Characterization of the port companies

For the questionnaire, two ports were selected, one in Brazil and another in Spain. The Brazilian port is ranked 101st among the world companies in container transportation (Container Management, 2011) under public management and moved 983,985 TEUs and 43,592 passengers in 2011.

In order to develop a comparative study, we selected a Spanish port also publicly-held, which transported 6,904,470 bulk tons, 4,350,000 TEUs, 716,443 passengers and 2,419 tons of fresh fish in 2011, and ranks 26th in the world companies of containers transportation (Container Management, 2011).

To select the ports for the study, some aspects were considered, such as: (i) being a publicly-held company; (ii) having as main product containers handling; (iii) accessibility for the study.

RESULTS

Based on the general characteristics, the port companies were questioned about the method of analysis of capital budgets, according to the first section of Table 3. The Brazilian port pointed out that sometimes they use the internal rate of return in this kind of evaluation, and the Spanish port always adopts all methods (payback, net present value, internal rate of return, discounted cash flow, real options).

Secondly wonders regarding the minimum acceptable rate of return for a new investment, the Brazilian company uses a random rate of return. The Spanish port uses the WACC approach. With respect to the minimum profitability index, both companies responded that they do not apply the same rates in all projects.

Table 3. Assessment tools of capital budget.

Assessment tools of capital budget	Spain	Brazil
Payback	X	X
Net Present Value	X	
Internal Rate of Return	X	X
Discounted Cash Flow	X	
Real Options	X	
Other. What?		

Source: Developed by the authors based on the review.

Table 4. The percentage of investments made in the past five years.

	Brazil (%)	Spain (%)
Maintenance projects	85	5
Expansion projects already existing	10	80
New expansion projects	5	15

Source: Data from the survey.

Regarding the technique used to estimate the risk of the investment, the Brazilian port responded that they use only the scenario analysis approach, and the Spanish port uses three techniques: scenario analysis, sensitivity analysis, and simulation, and often the decision tree.

According to both Brazilian and Spanish companies, the most critical and important phases in the investment analysis is the definition of the project and the cash flow forecast. The Spanish port also indicated the project execution as a critical aspect in the investment process.

Table 4 presents the percentage of investments made in the past five years.

At least one member of the top management is directly involved in the analysis and follow-up of the decisions on investment in both port companies. Although the Brazilian port does not have manual or basic guidelines for investments, this characteristic is present in the Spanish company.

Table 5 shows the degree of uncertainty or predictability in the port environment. The green color, with description of syllables (PB), represents the responses given by the Brazilian port, and the red (PE) by the Spanish one. The Brazilian port considers the behavior of suppliers and the financial market totally unpredictable, but these aspects are partially predictable in Spain. The behavior of competition and government, besides clients and technological changes, are indicated as partially unpredictable and sometimes predictable in Brazil, and partially predictable in Spain. The item where an inverted position was found is regarding the unions' behavior, which in Brazil is described as partially predictable, and in Spain sometimes predictable.

Table 5. Degree of uncertainty and predictability in ports environment.

	Totally un-predictable	Partially un-predictable	Sometimes	Partially predictable	Always predictable
Suppliers' behavior	PB			PE	
Competition behavior		PB		PE	
Clients' tastes and preferences			PB	PE	
Financial market behavior	PB			PE	
Government behavior		PB		PE	
Unions behavior			PE	PB	
Technological changes			PB	PE	

Source: Data from the survey.

Table 6. Frequency of information obtained by the port's information system.

	Always	Sometimes	Occasionally	Rarely	Never
Projected cash outflows	PE		PB		
Projected cash inflows	PE		PB		
Cost of capital and minimum rate of return	PE			PB	
Service life	PE			PB	
Macroeconomic data		PE		PB	
After-auditing review	PE			PB	

Source: Data from the survey.

For the evaluation of capital expenditures, some information is essential in the decision-making process, according to Table 6. So, they were asked to identify how often the information can be obtained from the company's information system. The Spanish company reported that information on estimated inflows and outflows, cost of capital and minimum rate of return, service life, and after-audit reviews are always available, and macroeconomic data sometimes.

In Brazil, such information is occasionally or rarely available. This shows that the Brazilian port demands investments on information systems necessary for the management's decision making.

DISCUSSION AND CONCLUSION

Discussion of results

The results of the application of the techniques for assessment of capital budgets, and particularly of the differences, are analyzed and contextualized according to the literature.

According to the literature, selecting the methods to assess capital budgets depends on various factors. In general, the application of the techniques is determined by the manager's individual preferences and the

environment in which decisions are made (Hermes et al., 2007).

Thus, possibly due to the environment instability, the Brazilian port company uses, for example, the internal rate of return instead of the payback method. Countries that historically have high interest rates, such as Brazil, require an examination in order to ascertain the merits of using the payback approach.

Although the results of the study by Hermes et al. (2007) show that the use of payback as the primary method for projects evaluation has decreased in the past years, it is still used as an important complementary tool. According to Hendricks (1983), 65% of the companies used PB as a secondary measure. Moreover, in the view of Brijjal and Quesada (2009), the companies should not use one technique only for capital budgeting, but instead should use all possible methods for evaluating the project.

The use of capital budgeting techniques by the Spanish port is related to the development of the budgeting system over time, which is a process divided into five phases. Phase 1 is accomplished in accordance with the formats, instructions and objectives proposed by OPPE (Organismo Público Puertos del Estado). Based on these guidelines and according to the strategic and master plan developed by the port authority, AP (*Autoridad Portuária*), the plan of investments is prepared,

which must be sent to the Investments Commission before execution. This has contributed to make the use of methods for evaluation of capital budgets more applicable, convenient and necessary.

Studies on companies have shown diverse results in the application of the methods for evaluation of capital budgets. In the study conducted by Graham and Harvey (2001), Brounen et al. (2004Hol), Hermes et al. (2007Hol), Truong et al. (2008), Holmén and Pramborg (2009), Brijlal and Quesada (2009), Bennouva et al., 2010; Crazi et al., 2010) the prevailing technique is the net present value; payback was the main method in the study by Peel and Bridge (1998), Sandahl and Sjogren (2002), Block (2003), Lazaridis (2004), Brounen et al. (2004UK/ALE/FRA), Lam et al. (2007); the internal rate of return was more referenced in the study by Arnold and Hatzopoulos (2000) and Hermes et al. (2007-China); and real options in the survey conducted by Hall and Millard (2010). The results have shown that the net present value and payback prevail over other techniques.

WACC was indicated by the Spanish port as the technique used to determine the rate of return. WACC is usually reported in studies on capital budgeting practices (Arnold and Hatzopoulos, 2000; Graham and Harvey, 2001; Ryan and Ryan, 2002; Block, 2003; Hermes et al., 2007; Truong et al., 2008; Bennouva et al., 2010; Crazi et al., 2010) as the most widely used technique to determine the minimum acceptable rate of return. The port company uses different rates for the projects, which corroborates the studies conducted by Brigham and Ehrhardt (2002), who recommend the use of different rates in investment projects.

Regarding risk analysis, the techniques most used are scenario and sensitivity analyses. This corroborates previous researches, which point out scenario analysis and sensitivity analysis as the techniques most used by corporations (Arnold and Hatzopoulos, 2000; Ryan and Ryan, 2002; Lazaridis, 2004; Brounen et al., 2004; Lam et al., 2007; Bennouva et al., 2010; Crazi et al., 2010; Hall and Millard, 2010).

The results of the study show that the review process is not considered important, suggesting that the managers continue to monitor the capital budgeting process without considering measures of adequacy and correction. According to Brijlal and Quesada (2009), implementation is the most difficult stage in the manufacturing industry, but project definition, analysis, selection and implementation are usually considered the most difficult stages in the retail business, and project definition, analysis and selection are reported as the most difficult in the services sector.

With regard to the percentages of investment in the past five years, Brazil has 10 and 5% allocated in new expansion projects. The lack of investments in sea ports is pointed out by several authors as one of the major bottlenecks to the country's growth. According to Filho (2007), since the beginning of the nineteenth century, the

investments made in ports (improvement, retrofitting, modernization) have always been insufficient to meet the growing volume of the foreign trade in Brazil. Investments ripened rapidly towards bottlenecking, requiring more and new investments, but more complex and expensive than the previous ones.

A survey on the 101 largest exporters in Brazil performed by Wanke and Hajar (2009) indicates as bottlenecks for the exporters of bulk cargoes the transportation and access to ports, and for the exporters of containerized cargoes the transshipment of the containers to the trucks. Regarding the critical aspects of port-to-port operations, exporters of industrial inputs/intermediate products consider the poor quality of the facilities infrastructure for sea transportation and the exports/imports bureaucracy as a result of limitations in the production capacity.

Pike (1988) recommends the development of a budgeting manual when saying that the companies should preferably develop a manual of investments. With respect to audits on capital spending, both ports adopt it, which corroborates the study of Klammer and Walker (1984), Pike (1996).

The study also shows that the Brazilian port rarely uses information on investments. This corroborates Brooks' findings (2004) that the Brazilian ports need to use and remodel their management systems, including the development of new information systems.

The level of a country's economic development and the degree of sophistication of the capital budgeting techniques implemented are positively related (Hermes et al., 2007). This means that if the persons responsible for examining the company's investment projects have higher education they will certainly have fewer problems to understand the use of more sophisticated capital budgeting techniques.

For example, the controller of the Spanish port has a doctoral degree and probably has great familiarity with capital budgeting methods. Studies show that there is a connection between educational background and the use of the NPV technique, indicating that education plays an important role in the use of discounted cash flow techniques, such as NPV (Brijlal and Quesada, 2009).

According to Brito (2010), the first difference between the ports in Brazil and the most efficient in the world, such as the port of Rotterdam in Holland, relates precisely to professional management. Another difference refers to the professional background at all levels, indicating that the port companies should always renovate to become profitable and financially sufficient, train their staff constantly, monitor results, and have variable pay systems based on performance.

To meet these challenges, Pizzoloto et al. (2010) suggest that companies should: implement strategic planning, know the market, identify the clients' demands for services, identify business opportunities to leverage cargo handling services, as well as appropriate

knowledge on relative advantages of their competitors, so as to anticipate actions and ensure the expansion of port services.

The size of the company can also influence the use of capital budgeting techniques, as some studies reported and indeed had evidences that larger companies tend to use sophisticated techniques (Payne et al., 1999; Ryan and Ryan, 2002; Brounen et al., 2004), what might have influenced the results of this research because the Spanish port has a considerably higher volume of cargo handling services.

Different levels of economic development may also explain the differences in the results regarding the use of capital budgeting techniques. These results can be explained by the gap that still exists between the countries with regard to economic, financial, human and technological development.

Practical and political implications of the study

According to the results presented, there is still a gap between theory and practice in the use of capital budgeting techniques in the Brazilian port, on the other hand, the same was not observed at Spanish port that represents the manager's advanced knowledge levels and the managerial processes about capital budget on the port. This study shows some evidence that projects of investments in Brazilian ports have not been evaluated according to the recommendations in the literature.

The study contributes to understanding better the utilization of the capital budget techniques. The techniques applied can be related with manager's knowledge level of the port and the managerial tools. The results obtained can call the attention of the ports and managers about the need and importance of the aspects related to decision makers' knowledge and the governmental and institutional efforts to increase the professional qualification levels as well as for the development and utilization of a more sophisticated models, manuals, polices and investment policies in ports.

Among the recommendations of the study, the following aspects are included: (i) training and development of competences for port services managers; (ii) executives development programs to obtain empirical knowledge from consultants and specialists; (iii) greater efforts must be made by the governments to ensure a high level of education for port companies' managers; (iv) the use of WACC and real options valuation, among other techniques; (v) development of investment manuals, guidelines and policies; (vi) development of skilled teams; (vii) use of standard models and information systems to generate parameters, among other demands.

This research presents contributions to the study of capital budgeting practices in Brazil, since no similar studies were found. Most of the studies available are

concentrated on big companies in the United States, Canada, Europe, South Africa, Malaysia and China. This work expands and enriches the results of previous studies.

The study presents an additional contribution to the existing literature on capital budgeting practices by undertaking a comparative study on different countries based on data collected. By showing in the comparative study the necessary improvement in the application of capital budgeting techniques in the Brazilian port, it can also serve as a parameter for changes.

This study also contributes to the debate on capital budgeting practices by comparing different corporate practices in different ports and countries in two continental markets. It also contributes by showing apparent differences in institutional contexts that can be significantly useful to financial management practices.

Limitations of the study

Some aspects of this work can present limitations and biases on the results. Firstly, researches of this kind may have potential biases from inadequate responses to the questions, although in this case the research kept confidential the information about the port and the respondents in order to minimize any possible impact on the responses.

Secondly, the research was limited to one port in Spain and another in Brazil, and this sample might not be representative of the population, that is, the results cannot be generalized to all Brazilian or Spanish ports.

Thirdly, the study was based on an intentional selection of ports. This had the advantage of facilitating the administration of the questionnaire in view of the researcher's accessibility, but it may also represent a bias to the research.

Finally, although the study expanded the scope of the issues discussed, compared to previous works, the focus was on aspects relating to capital budgeting. Other issues on capital budgeting can also be explored together, such as the port's businesses and size, which can deepen the discussions on the subject.

Final considerations

This paper presents the results of a research on capital budgeting practices and techniques in two ports in different countries with different levels of economic development. Thus, the objective of the study was to analyze the capital budgeting practices from a comparative perspective.

The results show that the Brazilian port uses the internal rate of return in capital budgets analyses, combined with random rate for minimum acceptable return, and scenario analysis to determine the investment's risks. The data

collected show a poor and not skilled process of analysis of capital budgeting.

Unlikely, the Spanish port uses all methods, including payback, internal rate of return, net present value and real options, besides weighted average capital cost – WACC to find the minimum rate of return, as well as scenario analysis, sensitivity analysis, simulation, and decision tree to determine the investment's risks.

Recognizing the need for further studies on the subject, we suggest other surveys to obtain more data regarding number of ports and practices, as well as the number of countries to be included in the study. So, the survey could be expanded by means of questionnaires administered to a larger number of Brazilian and Spanish ports.

We also suggest that future researches investigate variables such as the type of business of and size of the port to determine the impact on capital budgeting, among other aspects.

Conflict of Interests

The authors have not declared any conflict of interests.

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